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RCRA, Superfund & EPCRA Hotline Training Module

Introduction to:

Accidental Release Prevention Program
(CAA §112(r); 40 CFR Part 68)

Updated February 1998

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ACCIDENTAL RELEASE PREVENTION PROGRAM

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1. INTRODUCTION

One of the goals of the Emergency Planning and Community Right-to-Know Act (EPCRA) is to promote emergency planning activities, including safe management of dangerous chemicals. Several other federal laws also authorize programs to increase awareness of chemical hazards and to reduce the likelihood of chemical emergency situations. As a result of amendments made in 1990, the Clean Air Act (CAA) sets forth new requirements with goals similar to those of EPCRA. Specifically, CAA §112(r) calls for facilities covered by the risk management program requirements to reduce the likelihood and severity of accidental chemical releases through hazard assessments, prevention programs, and emergency response planning.

This module discusses CAA §112(r) and its implementing regulations at 40 CFR Part 68 in detail. The Hotline is responsible for this section of CAA not only because of the similar goals of EPCRA and CAA §112(r), but also because EPA charged the Chemical Emergency Preparedness and Prevention Office (CEPPO) with drafting and implementing the rules and other requirements of §112(r).

When you have completed this module you will be able to explain the purpose of CAA §112(r) and how it relates to the goals and requirements of EPCRA. Specifically, you will be able to:

- Understand the promulgation of the list of regulated substances
- Discuss the risk management program regulations
- Identify the Presidential Review
- Understand the relationship between EPA's risk management program regulations and OSHA's process safety management standard.

Use this list of objectives to check your knowledge of this topic after you complete the training session.

2. REGULATORY SUMMARY

The Clean Air Act's accidental release provisions are found in §112(r), as added by the 1990 CAA Amendments. The air toxics provisions in CAA §112 primarily address technology-based standards for routine emissions, while CAA §112(r) outlines a comprehensive program to help prevent accidental releases. Most of the CAA activities undertaken by CEPPO are mandated by this section of the Act.

The provisions for accidental release prevention in CAA §112(r) build on the planning and preparedness foundation laid by EPCRA and formalize many of the recommendations made in a 1988 study conducted under EPCRA §305(b) entitled Review of Emergency Systems. EPCRA is intended to encourage emergency planning efforts at state and local levels and to increase public awareness and understanding of potential chemical hazards present in the community. CAA approaches chemical safety from the inside, and mandates that facilities (i.e., "stationary sources") take steps to identify and control on-site hazards. It also requires stationary sources to inform the public of actions they are taking to prevent and mitigate the potential off-site effects of these hazards. CAA §112(r) fulfills the Agency's commitment to providing the public with protection from potential chemical hazards.

The major area of regulatory activity involves CAA §§112(r)(3)-(5) and (7). These subsections together authorize the accidental release prevention program discussed below. Because the Agency promulgated these regulations in two parts, the list of regulated substances and thresholds (CAA §§112(r)(3)-(5)) and the risk management program requirements (CAA §112(r)(7)) will be discussed separately.

In addition to directing EPA to develop the accidental release prevention regulations to protect human health and the environment outside of facilities, the Clean Air Act amendments of 1990 directed OSHA to develop similar regulations requiring chemical process safety management within the workplace. OSHA promulgated its final process safety management standard (PSM) rule in 1992. EPA was able to incorporate many of OSHA's definitions, requirements, and interpretations when developing the risk management program rule.

2.1 GENERAL DUTY CLAUSE

Under the CAA chemical accident prevention provisions, §112(r)(1) contains general duty requirements for stationary sources that manage any of the listed substances under §112(r)(3) or any other extremely hazardous substance to maintain a safe facility. The term "general duty" is similar to the general duty clause under the Occupational Safety and Health Act (OSHA), and has been used by OSHA as an enforcement tool since 1970 to address situations where no federal standard is in place. The general duty clause makes it clear that owners and operators of stationary

sources have a "general duty" to perform certain measures for accident prevention and mitigation, even in the absence of specific requirements under the risk management planning section of CAA. EPA is currently developing guidance on how the Agency will interpret and use the general duty clause in CAA §112(r)(1).

Although the CAA general duty clause is broad in scope, stationary sources are required to perform three distinct activities. These include identifying hazards that may result from accidental releases, designing and maintaining a safe facility, and working to minimize the consequences of accidental releases.

2.2 ACCIDENTAL RELEASE PREVENTION

While the general duty clause applies to virtually all stationary sources, CAA mandates that additional measures be taken for accident prevention by owners and operators of stationary sources that have certain chemical substances present above threshold amounts. EPA promulgated the list of regulated substances and their threshold quantities in a January 31, 1994, final rule, which is commonly referred to as the "list rule" (59 FR 4478). Owners and operators of stationary sources with a process containing any of the listed regulated substances in excess of the applicable threshold amount must comply with the risk management program regulations promulgated on June 20, 1996 (61 FR 31668). The list rule and the risk management program rule together constitute the accidental release prevention regulations promulgated pursuant to CAA §112(r). These regulations are codified at 40 CFR Part 68.

EPA estimates that approximately 66,000 stationary sources are potentially subject to the risk management program requirements. Covered facilities include most manufacturing sectors, cold-storage facilities that use ammonia for refrigeration, public drinking water and waste water treatment systems, wholesalers of chemicals, propane retailers, utilities, and a limited number of service industries, such as janitorial services and commercial laundries.

2.3 LIST OF REGULATED SUBSTANCES AND THRESHOLDS

CAA §§112(r)(3)-(5) required EPA to promulgate a list of regulated substances and thresholds that would trigger compliance with the risk management planning requirements. The list of regulated substances set forth in the list rule includes 77 toxic substances and 63 flammable substances. The list rule also included as regulated substances the class of explosive substances with a mass explosion hazard, as determined by the Department of Transportation (DOT) (49 CFR §172.101). However, these explosives were deleted on January 6, 1998 (63 FR 640). If a stationary source uses one of the regulated substances in a process in excess of the

assigned threshold quantity, it must comply with the risk management program requirements.

The Act specifies the criteria that the Agency had to consider in promulgating the list. Chemicals were evaluated based on severity of acute adverse health effects, likelihood of accidental release, and potential magnitude of human exposure to accidental releases. These three criteria are extremely broad, and EPA sought more specifically to define them by focusing on lethal effects resulting from acute exposure. Severity of acute adverse health effects is determined through analysis of the inherent hazards of the substances, such as toxicity or flammability. Likelihood of a release having an effect beyond the property line is determined through evaluation of the substances' physical and chemical properties, for example, the probability of a chemical becoming airborne and being carried beyond the boundary of the stationary source, as well as other surrogate measures, such as production volume and prior accident history. Using this methodology, EPA formed the list of regulated substances with three categories: toxics, flammables, and explosives.

Toxics

The listing criteria established for toxic chemicals take into account acute toxicity, physical and chemical properties (e.g., physical state and vapor pressure), production volume, and accident history. The Agency used the EPCRA extremely hazardous substances (EHS) list as a starting point for the proposed list of toxic substances (58 FR 5102; January 19, 1993) and focused on EHS gases, highly volatile liquids, high production volume substances, and substances with an accident history. To narrow the EHS list, EPA eliminated a number of solids and non-volatile liquids, as well as chemicals not currently in production. These substances are not likely to pose significant off-site risks. The Agency then identified chemicals that did not pose sufficient threats due to low vapor pressures. The final rule set a vapor pressure cut-off of 10 mm of mercury; chemicals with a vapor pressure below that level were removed from the proposed list, provided that accident history did not warrant their retention or they were not mandated by statute. The adopted list includes 77 toxic substances that meet the above criteria, including 16 substances mandated by statute. Of the toxics on the final list, only toluene diisocyanate, which is mandated by statute, and oleum, which has a significant accident history, do not meet the 10 mm mercury cut-off.

Flammables

EPA also considered physical hazards of chemicals in relation to acute health effects. One of these physical hazards is flammability. Hazard data, physical and chemical properties data, and accident history again guided the Agency's selection process. EPA adopted the criteria used by the National Fire Protection Association (NFPA) for identifying flammable gases and liquids with the highest degree of hazard for flammability. Accident history indicated that vapor cloud explosions pose the most serious community hazard, affirming EPA's decision to list flammables that, based

on their boiling and flash points, generate vapor cloud explosions. To this end, the selection criteria revealed that flammable gases and volatile flammable liquids posed the greatest threat of accidental, harmful release. The final list of flammables contains 63 substances.

THRESHOLDS

Thresholds under CAA §112(r) are not determined using any of the methods set forth under EPCRA. While EPCRA thresholds are facility-based and make no allowance for separate processes, CAA §112(r) has adopted the OSHA definition of process which establishes that thresholds are determined based on the amount of a chemical present in a process at any one time. Process is defined to include any activity involving a regulated substance, including any use, storage, manufacturing, handling, or on-site movement. A single process may include a group of vessels that are interconnected, or separate vessels that are located such that an incident involving a regulated substance at one vessel is likely to affect another vessel (40 CFR §68.3). Threshold quantities for individual toxic substances range from 500-20,000 pounds. The threshold for all listed flammable substances is 10,000 pounds. An owner or operator of a stationary source that has more than a threshold quantity of a regulated substance in a process must comply with the risk management program requirements of 40 CFR Part 68.

Determining Thresholds for Mixtures: Toxics and Flammables

When a regulated toxic substance is present in a mixture or solution, the owner or operator need only consider the weight of the toxic substance (not the weight of the entire mixture) when determining whether a threshold quantity has been exceeded. This applies to all listed toxic substances, including those with concentration qualifiers (e.g., "concentration 80% or greater").

When determining whether a threshold quantity has been exceeded for a mixture containing a regulated flammable substance that is in a mixture, the entire weight of the mixture must be counted, unless the mixture as a whole does not meet the criteria for the National Fire Protection Association's highest flammability hazard rating, NFPA-4 (see Threshold Exemptions section below).

Threshold Exemptions

Several exemptions contained in the list rule limit the quantities of substances included in threshold determination. Many of these parallel exemptions are provided under EPCRA.

There are exemptions found in 40 CFR §§68.115(b)(1) through (3) for mixtures of toxic and flammable substances, as well as covered explosives. A de minimis exemption applies to mixtures that contain a regulated toxic substance at a

concentration of less than one percent, except when otherwise specified by listing (the de minimis for hydrochloric acid is 37 percent, aqueous ammonia 20 percent, and hydrogen fluoride 50 percent). Further, mixtures of toxic substances (other than oleum, toluene 2,4-diisocyanate, toluene 2,6-diisocyanate, and toluene diisocyanate) that can be proven to exhibit a partial pressure of less than 10 millimeters of mercury are exempt from inclusion in threshold determination.

Mixtures that contain less than one percent flammable substances by weight also qualify for a de minimis exemption. If the concentration of the flammable substance is one percent or greater, the mixture may still qualify for the de minimis exemption under certain conditions. If the owner or operator can demonstrate that the mixture itself does not meet specific boiling point and flash point criteria, the flammable substances contained in the mixture are exempt from threshold determination (40 CFR §68.115(b)(2)).

In the April 15, 1996, Federal Register (61 FR 16598), EPA proposed to change this method of threshold determination for mixtures containing regulated flammable substances. The proposed rule would exempt mixtures that do not meet all of the criteria for the National Fire Protection Association's highest flammability hazard rating, NFPA-4. Since the boiling point and flash point criteria for the existing flammables exemption are only two components of the NFPA-4 criteria, the proposed exemption for flammable substances in mixtures would have broader applicability than the original exemption. While the proposed amendments are being finalized, EPA has stayed the original provisions of 40 CFR §68.115(b)(2) such that only mixtures of regulated flammable substances that meet the proposed NFPA-4 criteria (not just the boiling point and flash point criteria) need be considered toward the 10,000-pound threshold (40 CFR §68.2). This rule was finalized on January 6, 1998 (63 FR 640).

Ammonia used as an agricultural nutrient, when held by farmers, is exempt from all of the 40 CFR Part 68 Accidental Release Prevention Program regulations.

The remaining exemptions parallel those found under EPCRA. These are found at 40 CFR §§68.115(b)(4) through (6), and include exemptions for substances:

- Contained in "articles" as the term is defined by OSHA in 29 CFR §1910.1200(b)
- Part of a structural component of a facility
- Used for routine janitorial maintenance
- Contained in foods, drugs, cosmetics, or other personal items used by employees
- Present in water or air drawn from the environment or municipal sources

- Manufactured, processed, or used at laboratories under the supervision of a technically qualified individual as defined in 40 CFR §720.3(ee).

On January 6, 1998 (63 FR 640), EPA finalized additional exemptions for:

- regulated flammable substances in gasoline, when in distribution or related storage for use as fuel for internal combustion engines;

- regulated flammable substances in naturally occurring hydrocarbon mixtures prior to entry into a natural gas processing plant or a petroleum refining process unit; and

- naturally occurring hydrocarbon reservoirs.

EPA is in the process of proposing amendments to the RMP rule to adopt the NAICS codes, which replace the SIC codes, add some RMP data elements, clarify procedures for submitting confidential business information (CBI) in an RMP. A proposed rule is expected March 1998.

2.4 RISK MANAGEMENT PROGRAM REGULATIONS

While all stationary sources with hazardous chemicals are subject to the general duty clause, those stationary sources handling, processing, or storing certain regulated substances in amounts above the threshold quantity (see Section 2.3 of this module) must develop plans for mitigating the risks to the community posed by these substances (CAA §112(r)(7)). The statute directed EPA to publish regulations and guidance for the prevention of chemical accidents, including requirements for risk management planning. These regulations were promulgated in the risk management program final rule on June 20, 1996 (61 FR 31668).

The Clean Air Act identified the specific elements to be addressed by the regulations for the prevention of accidental releases. In order to detect, prevent, minimize, and respond to accidental releases of regulated substances, each covered stationary source must develop a risk management program, including a hazard assessment, an accidental release prevention program, and an emergency response program. Covered stationary sources must produce a risk management plan (RMP) that summarizes the results of hazard assessments and analyses and the implementation of the risk management program requirements.

Program Levels

To ensure that individual processes are subject to appropriate requirements that match their size and the risks they may pose, EPA has classified them into three categories or "programs." Program 1 processes are those that meet specific criteria

establishing that they do not present a substantial hazard to people or the environment off site. These processes are subject to minimal requirements, including a hazard assessment and submission of an abbreviated risk management plan (RMP), but excluding the prevention and emergency response program elements. Processes classified as Program 3 are subject to the most stringent requirements, including a hazard assessment, a prevention program modeled after OSHA's process safety management standard (PSM), an emergency response program, and a management system requirement. Program 3 includes processes that fall under specified SIC codes and all processes subject to OSHA's PSM, unless those processes qualify for Program 1. The Program 3 prevention requirements are essentially identical to OSHA's PSM standard. Thus, a source owner or operator responsible for a process that is in compliance with OSHA's PSM will already be in compliance with the prevention requirements of the risk management program regulations. All other processes fall into Program 2, and are subject to most of the same requirements as Program 3, but with a streamlined version of the prevention program requirement. The major requirements for processes in each of the three program levels are summarized in Table 1 below.

Table 1: Major Requirements

	Program 1	Program 2	Program 3
Hazard Assessment	· worst-case analysis · accident history	· worst-case analysis · alternative releases · accident history	· worst-case analysis · alternative releases · accident history
Prevention Program		· safety information · hazard review · operating procedure · training · maintenance · investigate incidents · compliance audit	· process safety information · process hazard analysis · operating procedure · training · mechanical integrity · investigate incidents · compliance audit · manage changes · pre-startup review · contractors · employee participation · hot work permits
Emergency Response Program	· coordinate w/LEPC	· response plan · equip. procedures · response training · review/update plan · written plan · coordinate w/LEPC	· response plan · equip. procedures · response training · review/update plan · written plan · coordinate w/LEPC

Hazard Assessment

The Hazard assessment consists of three main components: a worst-case release scenario analysis; an alternative release scenario analysis; and a five-year accident history. For Program 1 processes, only the worst-case release scenario analysis and the five-year accident history must be completed, whereas all three components are required for Program 2 and 3 processes. The worst-case release and alternative release scenario analyses together constitute the "off-site consequence analysis," a method for determining the environmental and public receptors potentially affected by accidental releases from a covered process at a stationary source. The five-year accident history includes all accidental releases from covered processes that resulted in deaths, injuries, or significant property damage on site, or in deaths, injuries, evacuations, sheltering in place, property damage, or environmental damage off site.

Key to the analysis of off-site consequences is the concept of an "endpoint." For each regulated toxic substance, the endpoint is a specific concentration value (in mg/L), which is listed in 40 CFR Part 68, Appendix A. For regulated flammable substances, the endpoints vary according to the scenarios studied. For a worst-case release scenario involving a regulated flammable substance, the consequence of concern is a vapor cloud explosion, with an endpoint based on overpressure of one psi. For

alternative scenarios (e.g., fires), other endpoints (e.g., heat radiation) may need to be considered.

The worst-case release is a catastrophic release of "the largest quantity of a regulated substance from a vessel or process line failure that results in the greatest possible distance to an endpoint" (40 CFR §68.3). The alternative release scenario is one that is more realistic and more likely to occur than the worst-case release, and stationary source owners and operators have a considerable amount of flexibility in selecting alternative release scenarios that are the most useful for communication with the public and emergency responders and for response preparedness and planning.

Prevention Program

The prevention programs for both Program 2 and Program 3 processes must include a compilation of specific safety information, development of written operating procedures, and training of employees in those procedures. Both programs also require stationary source owners and operators to implement procedures for maintaining the mechanical integrity of the process equipment, to conduct internal compliance audits, and to investigate every incident which results in, or could reasonably have resulted in, a catastrophic release of a regulated substance.

The remaining prevention program requirements then differ slightly for Program 2 and Program 3 processes. The main prevention program component for Program 3 processes is a comprehensive process hazard analysis (PHA), which consists of a rigorous, step-by-step examination of processes, equipment, and procedures to identify each point at which an accidental release could occur. Instead of a full PHA, the Program 2 prevention program consists of hazard review, which identifies the hazards associated with the process and regulated substances, opportunities for equipment malfunctions or human error, and steps to monitor or detect releases.

Emergency Response Program

Despite the best emergency planning and prevention efforts, stationary sources still must be prepared to respond to accidents that do occur. Consequently, the risk management program regulations include a requirement for owners and operators of stationary sources with covered Program 2 or 3 processes to develop and implement an emergency response program. This program must include a written plan detailing procedures for informing the public and local emergency response agencies about accidental releases, necessary first-aid and medical treatment for accidental human exposures, and other emergency response procedures. A stationary source's response plan must be coordinated with the community emergency response plan developed by the LEPC under EPCRA §303. The emergency response program also must include development of procedures for use, inspection, testing, and maintenance of emergency response equipment, and training for all employees in emergency response procedures.

Risk Management Plan (RMP)

The risk management plan (RMP) is the written documentation of a stationary source's risk management program. RMPs must be submitted by June 21, 1999, or the date on which a regulated substance first becomes present above a threshold quantity in a process, whichever is later (40 CFR §68.10(a)). Although a stationary source may have processes in one or more of the three programs, the owner or operator must submit a single RMP that includes the required information for all covered processes at that source (40 CFR §68.150(a)). The owner or operator of a covered stationary source must revise and update the RMP within five years of the original submission or most recent update, whichever is later. Revised and updated RMPs are also due within six months of a change that requires a revised process hazard analysis, hazard review, or off-site consequence analysis, or a change that alters the program level that applied to any covered process. (40 CFR §68.190(b))

2.5 CHEMICAL SAFETY BOARD (CAA §112(r)(6))

To address accidental releases on a national level, the Clean Air Act requires the President to appoint a five-member Chemical Safety and Hazard Investigation Board to investigate chemical releases that result in death, injury, or substantial property damage (CAA §112(r)(6)). Serving as a focus for leadership in elevating accidental release prevention awareness, the primary purpose of the board is to determine the cause of accidents and to disseminate that information to the public. The board has additional authority to publish reports on chemical safety, suggest issues that EPA or OSHA should pursue with rulemakings, establish requirements for reporting accidents to the board, and conduct studies with respect to the potential for accidental releases. In the Summer of 1994, President Clinton nominated industry and government representatives to the Chemical Safety and Hazard Investigation Board. Due to budget cuts, however, the Board never became active. In 1997, the Board was formed. Prior to the Board's 1997 decisions, OSHA and EPA jointly investigated chemical accidents and prepared reports..

2.6 PRESIDENTIAL REVIEW

To identify any gaps or overlaps in regulatory programs that together comprise federal accidental release authorities, the President was required by CAA §112(r)(10) to conduct a "Presidential Review" of the capabilities of various federal agencies to conduct activities in chemical release prevention, mitigation, and response. In December 1993, EPA published the findings of the study in a Report to Congress titled A Review of Federal Authorities for Hazardous Materials Accident Safety. The report concluded that existing federal response mechanisms create a costly and complex web of regulations. The Presidential Review recommends a two-track approach to rectifying inefficiencies in the overall response system. First, it identifies key issues crucial to improving the existing federal safety system. The

report then suggests a focus on the technical implications of those issues, and recommends substantial participation by affected groups in identifying future statutory changes intended to alleviate the inefficiencies. The report is available through the Hotline.

2.7 HYDROGEN FLUORIDE STUDY

Under CAA §112(n)(6), EPA was required to conduct a study of the industrial and commercial uses of hydrogen fluoride (HF) and its potential hazards to public health and the environment. Congress further instructed the Agency to consider a range of events including worst-case accidental releases, and to make recommendations for the reduction of hazards, if appropriate.

EPA published the Hydrogen Fluoride Study: Report to Congress in September 1993. EPA concluded that the likelihood of an accidental release of HF can be kept low if facility owners/operators exercise the general duty and responsibility to design, operate, and maintain safe facilities. EPA did not recommend legislative action from Congress to reduce the hazards associated with HF. The Agency believes that the legislative authorities already in place provide a solid framework for the prevention of accidental chemical releases and preparedness in the event that they occur.

Although Congress mandated that EPA conduct the study under CAA §112(n)(6), the Hotline is responsible for understanding the contents of the report. Furthermore, the EPCRA Hotline is the main distribution point for the HF study.

3. MODULE SUMMARY

The CAA §112(r) Accidental Release Prevention Program provisions require owners and operators stationary sources that process, use, or store chemicals found on the list of regulated substances to develop risk management programs and submit risk management plans. In developing risk management programs, facilities must perform a hazard assessment, establish a prevention program, and develop and implement an emergency response program. The extent to which each of these requirements must be met depends upon the program level(s) of the processes at a stationary source. All these activities must then be summarized in a risk management plan.